

(19) World Intellectual Property  
Organization  
International Bureau



(43) International Publication Date  
20 January 2005 (20.01.2005)

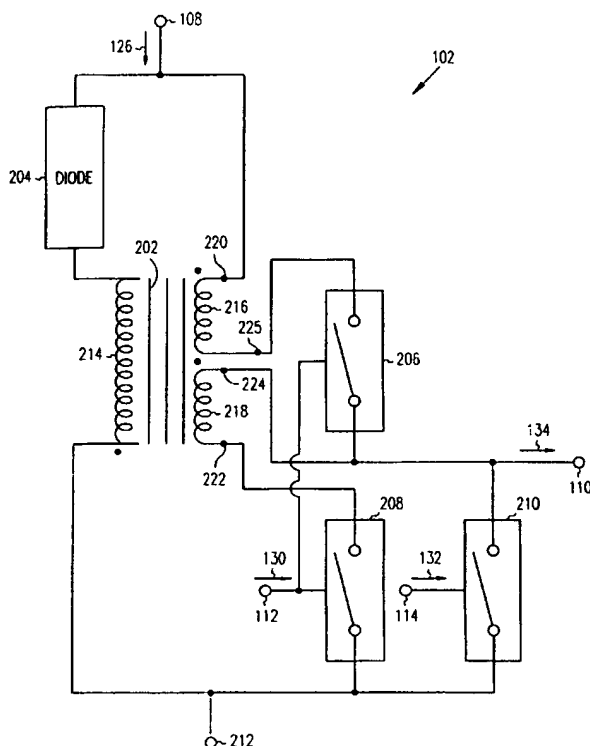
PCT

(10) International Publication Number  
**WO 2005/006524 A3**

- (51) International Patent Classification<sup>7</sup>: **H02M 3/02**
- (21) International Application Number:  
PCT/US2004/019250
- (22) International Filing Date: 16 June 2004 (16.06.2004)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:  
10/612,299 30 June 2003 (30.06.2003) US
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- (81) Designated States (*unless otherwise indicated, for every kind of national protection available*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (84) Designated States (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI,

[Continued on next page]

(54) Title: VOLTAGE CONVERTER



(57) Abstract: A converter (100) includes a transformer circuit (102), a filter (104), and a controller. The transformer circuit is coupled to the filter, and the controller is coupled to the transformer circuit and the filter. The transformer circuit includes an input port (108) and an autotransformer (202) coupled to the input port. The converter receives an input signal at the input port and the filter generates an output signal at an output port (110). The controller receives the output signal from the filter and provides one or more control signals to the transformer circuit to control the output signal. A method includes receiving a first input signal at a transformer circuit including a first coil (116) and a second coil (118), activating a first switch (206) to serially connect the first coil to the second coil, activating a second switch (208) to connect the second coil to a second input signal, deactivating the first switch and the second switch, and activating a third switch (210) to connect the first switch to the second input signal (212).



FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI,  
SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ,  
GW, ML, MR, NE, SN, TD, TG).

(88) Date of publication of the international search report:  
9 June 2005

**Published:**

— with international search report

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

# INTERNATIONAL SEARCH REPORT

International Application No

PCT/US2004/019250

A. CLASSIFICATION OF SUBJECT MATTER  
IPC 7 H02M3/02

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H02M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EP0-Internal

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	<p>US 6 304 460 B1 (CUK SLOBODAN) 16 October 2001 (2001-10-16) abstract column , 5, line 6-10; column 14, line 7-13; column 22, line 18-27; column 5, line 6 - line 10 column 18, line 44 - line 50 column 19, line 4 - line 7 from column 41, line 60 up to column 42, line 14 claims 46,47,54 figures 17a,43 column 13, line 60-67, fig. 15f; column 45, line 2-7, fig. 46f ----- -/--</p>	<p>1-7, 10-14</p>

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

\* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

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"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

24 November 2004

Date of mailing of the international search report

24 MAR 2005

Name and mailing address of the ISA

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# INTERNATIONAL SEARCH REPORT

International Application No

PCT/US2004/019250

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>EP 1 300 934 A (CONST ELECTRONIQUES &amp; TELECOMM) 9 April 2003 (2003-04-09)  paragraph [0014] - paragraph [0026]  paragraph [0046]  figures  -----</p>	1-14

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# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US2004/019250

## Box II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:  
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-14

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

# INTERNATIONAL SEARCH REPORT

International Application No. PCT/ US2004/ 019250

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-14

A converter comprising: a transformer circuit including an input port and an autotransformer coupled to the input port, the input port to receive an input signal; a filter ; a controller coupled to the transformer circuit and the filter, the controller to receive the output signal from the filter and to provide one or more control signals to the transformer circuit to control the output signal.

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2. claims: 15-21

A method comprising: receiving a first input signal at a transformer circuit including a first coil and a second coil; activating a first switch to serially connect the first coil to the second coil; activating a second switch to connect the second coil to a second input signal; deactivating the first switch and the second switch; and activating a third switch to connect the filter input signal to the second input signal to the second input signal

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3. claims: 22-25

A communication system comprising: a transformer circuit including a first switch to receive a first signal, a second switch to receive a second signal, an autotransformer coupled between the first switch and the second switch, and a diode connected to the second switch and to receive the first signal; a filter; a controller to receive the output signal to provide one or more control signals; and a transceiver to receive the output signal

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4. claims: 26-28

A computer system comprising: a processor; and a converter including a controller coupled to an autotransformer and a filter to provide power to the processor

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# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US2004/019250

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 6304460	B1	16-10-2001	AU 5943901 A CN 1440586 A JP 2003533163 T WO 0186792 A1	20-11-2001 03-09-2003 05-11-2003 15-11-2001
EP 1300934	A	09-04-2003	EP 1300934 A1 WO 03032476 A2 EP 1444768 A2	09-04-2003 17-04-2003 11-08-2004

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